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difficulties which had seemed inherent to that type of apparatus. The Tesla motor is now controlled by the Westinghouse Electric Company, and that powerful organization has been exerting all of its energies to make the machine a success, but apparently to no great effect.

There comes from Europe, however, the account of a new motor, which, if we are to believe the figures given, accomplishes all that the Tesla motor promised; and while the latter required a special distributing system, using at least three wires to bring current to the motor, the new machine can be used in connection with the ordinary alternating system employed for incandescent lighting, and only two wires are necessary for the connections.

Messrs. Ganz & Co. of Buda-Pesth have been engaged for four years in experiments on various forms and types of alternating-current motors. Their most recent production gives results such that they feel confident that the performance of continuous-current motors will be attained. The machine in question gave, at 730 revolutions, 30.7 horse-power, or 22,700 watts of work, while the apparent energy consumed was 29,800 watts, and the real energy 27,700 watts, thus giving an efficiency of 80.9 per cent. The ratio between the real and apparent energy consumed was .92, or nearly unity, and this is a very important point. Ordinarily the ratio is less than one-half, the difference of phase between the current and electro-motive force being considerable; so that a great deal of current flows through the motor, which does little more than heat it, the machine running first as a motor, then as a dynamo, the difference between the work done on and by it being small, while the current might have a considerable value. The figures given above were obtained from a model, which was not constructed to give the greatest possible efficiency or output, but which was designed for purposes of study. When properly made machines are turned out, the efficiency should not be less, according to the designers, than 90 per cent.

It is a pity that no description of the machine, nor more accurate experimental data, is available. One can hardly see why such very meagre results should be sent out by the makers. If any thing is given, it should be enough to enable people to judge for themselves the merits of the invention; but the firm of Ganz & Co. is one of great respectability, and there seems to be now some hope that a successful alternating-current motor has been discovered.

RELATION BETWEEN DENSITY OF ACID AND CAPACITY IN SECONDARY BATTERIES. — M. Heim, at the Electro-technical Institute at Hanover, has experimented on the capacity of storage-cells with different strengths of acid. Two types of cells were used, — the Tudor and the Julien. These had a normal capacity of about 50 ampère hours; and, for a first experiment, acid of a strength of from 15 to 20 per cent was used, and the cells were charged and discharged three times, there being an interval of a day allowed between the charge and discharge. The next step was to fill the cells with acid of a strength of, say, 9 or 10 per cent, and again determine the capacity, there being always a number of discharges for each strength of acid, the discharge always lasting until the electro-motive force had fallen 10 per cent from its original value. The results obtained are, that the capacity increases rapidly with an increase of from 10 to 14 per cent in the strength of the acid; that it reaches a maximum at a strength of 16 per cent; then decreases slowly at first, and afterwards rapidly, as the density of the solution increases. M. Heim also made experiments to find out the strength of solution at which the support-plate begins to be attacked. He found that strengths even as low as 20 to 25 per cent were too concentrated, and, as the result of his work, recommends a density of 16 per cent (1.108). This is not so high as that ordinarily employed, the usual density varying from 1.150 to 1.200.

A NEW ARC-LAMP. — A new type of arc-lamp has been introduced into England from France by the Planet Electrical Engineering Company. The upper carbon is fed by means of an electric motor which drives a worm and a train of gearing. The field-magnets of the motor are in series with the arc, the armature being connected as a shunt to the field-magnets. The difference of potential at the two brushes of the motor is two volts. When the lamp is burning steadily, the motor is at rest; but, when the resistance of the arc increases, a solenoid core pulls down a lever, making contact to the armature, which immediately commences to revolve. Should the arc be made too short, the solenoid reverses the connections, and the armature revolves in the opposite direction. The advantage of the arrangement is, that there is plenty of power to overcome the friction of the slide, and that, with the exception of the solenoid, there are no fine adjustments.

QUARTZ AS AN INSULATOR. — At a recent meeting of the London Physical Society, Mr. C. V. Boys read a paper on the above subject, which is not without some practical interest. It will be remembered that Mr. Boys some time ago succeeded in obtaining extremely fine and strong fibres of quartz by shooting an arrow to which was attached a piece of quartz softened by heat. These fibres may be used instead of silk for delicate suspensions in electrical instruments. In making these fibres, Mr. Boys observed that if they were very fine, and broke between the bow and the target, the extremities assumed the form of a screw about half an inch in diameter and eight or ten inches long. If any body were brought near this screw, the end of it would shoot out toward it, retreating again when the body was removed. It hardly seemed possible to account for this in any other manner than by supposing the fibre to be electrified. If this were the case, it would show that quartz was an exceptionally good insulator, since ordinarily the exceedingly minute charge on the extremely slender fibre would be dissipated almost as soon as it was formed. Carrying his experiments further, Mr. Boys found, that while, even under any circumstances, quartz is a better insulator than glass, under ordinary atmospheric conditions there is no comparison between them. To show these insulating properties, a gold-leaf electroscope was made, the leaves being suspended by a quartz hook. In order to make the conditions as unfavorable as possible, a dish of water was placed in the case. After five hours, the deflection of the charged leaves had only decreased about a quarter. If glass had been substituted for the quartz, the leaves would have been completely discharged in considerably less than a minute. As quartz can be easily softened, and can be readily worked when soft, it should be of great value for electrostatic instruments, where there is always great trouble from leakage. Mr. Boys stated that even when quartz was dipped in ammonia, or boiled in potash, it only required washing to completely restore its insulating properties, and, even when it is raised to a red heat, these properties are recovered on cooling. Some quartz which was kept in fused potash for a considerable time lost its insulating properties to some extent; but, even after this treatment, it was better than glass.

HEALTH MATTERS.

VENTILATION. — The *Sanitary News* gives the following advice in reference to the admission of air to rooms: "Air should be introduced and removed at those parts of the room where it would not cause a sensible draught. Air flowing against the body at, or even somewhat above, the temperature of the air of the room, will cause an inconvenient draught, from the fact, that, as it removes the moisture of the body, it causes evaporation or a sensation of cold. Air should never, as a rule, be introduced at or close to the floor-level. The opening would be liable to be fouled with sweepings and dirt. The air, unless very much above the temperature of the air of the room, would produce a sensation of cold to the feet. It may be regarded as an axiom in ventilating and warming, that the feet should be kept warm and the head cool. The orifices at which air is admitted should be above the level of the heads of the persons occupying the room. The current of inflowing air should be directed toward the ceiling, and should either be as much subdivided as possible by means of numerous orifices, or be admitted through conical openings with the smaller opening toward the outer air and the larger openings toward the room, by which means the air of the entering current is very rapidly dispersed. Air admitted near the ceiling very soon ceases to exist as a distinct current, and will be found at a very short distance from the inlet to have mingled with the general mass of the air, and to have attained the temperature of the room, partly owing to the longer mass of air in the room with which the inflowing current mingles, partly to the action of gravity in cases where the inflowing air is colder than the air in the room."

CHOLERA TREATMENT. — Dr. Yvert, who claims to have had a large experience in the treatment of Asiatic cholera, reports that by the use of bichloride of mercury he has been able to reduce the mortality from 66 to 20 per cent. He also says, that, used as a prophylactic in those who have recently arrived in a region infected with cholera, it has in every instance warded off the disease.

YELLOW-FEVER IN FLORIDA. — From the best information we have been able to obtain, the reported case of yellow-fever at Sanford, Fla., was a true case. The patient, a Mrs. Dumont, wife of a boarding-house keeper, died April 20.

INSOMNIA. — Insomnia is an affection which is trying to both physician and patient alike, and many are the remedies which have been recommended for its cure. The latest of these is the peanut, eaten *ad libitum* just before retiring. A member of the clergy reports success with the peanut after having tried other means without result.

TOBACCO-SMOKING. — We have recently given the views of different physicians as to the effects of tobacco-smoking upon health, and have also referred to experiments bearing upon the question of the antiseptic power of tobacco-fumes. Additional evidence on these points is constantly accumulating. Dr. Hajek of Vienna has declared that smokers are less liable to diphtheria than non-smokers in the ratio of 1 to 2.8; and Dr. Schiff says that smoking is forbidden in the bacteriological laboratories, because it is known to hinder the development of bacteria in the various culture-media.

ACTION OF ELECTRIC LIGHT ON THE EYES. — A new disease, called photo-electric ophthalmia, is described as due to the continual action of the electric light on the eyes. The patient is wakened in the night by severe pain around the eye, accompanied with excessive secretion of tears. An oculist of Cronstadt is said to have had thirty patients thus affected under his care in the last ten years.

BOOK-REVIEWS.

Physiological Notes on Primary Education and the Study of Language. By MARY PUTNAM JACOBI, M.D. New York and London, Putnam. 12°. $1.

"IF literature were the business of life, or if, as was at one time supposed, education meant nothing else but acquaintance with literature, there would be some logic in the extraordinary prominence habitually assigned in education to the study of modes of expression. But from the modern standpoint, that education means such an unfolding of the faculties as shall put the mind into the widest and most effective relation with the entire world of things, spiritual and material, there is an exquisite absurdity in the time-honored method." Such is the opinion of the author; and such, we are glad to say, is the growing opinion of all observant men and women, except, perhaps, those whose observation is limited by the walls of their classrooms, and who do not discern the signs of the times. Dr. Jacobi gives us, in this book of but one hundred and twenty pages, the account of a most interesting personal experiment in primary education, in which a child was taught algebraic signs as a means of concisely expressing certain relations, long before any attempt was made to learn how to write. It would be interesting, did space permit, to follow in detail this experiment. By the time the child was four and a half years old, she had learned the following elements: straight, curved, slanting, and half-slanting lines; also to distinguish perpendicular and horizontal lines, and to draw either straight or curved lines parallel to each other. She was well acquainted with all forms of the triangle, the rectangle, square, trapezium, trapezoid, pentagon, hexagon, circle, and cube. When five years, the child was taught the equality of any two subjects which were demonstrably equal to the same third. And so the child went on to arithmetic, the meaning of words, and botany, before she was six years old.

The author discusses quite fully the place for the study of language in a curriculum of education. On this subject Dr. Jacobi says that it is necessary to maintain a just proportion between the study of languages and the other studies of a general curriculum. The effect on mental development and training is to be obtained, if at all, by the age of fourteen, fifteen, or sixteen. By this time the pupil requires the broader and more robust discipline of other knowledge, pursued with the thoroughness of scientific method which will then be practicable. It is undesirable to continue the systematic study of languages at this time (they should be dropped altogether); although the habit of reading in all may be most profitably kept up, and other subjects, especially history, studied through their medium. We must confess a great deal of surprise at some of the results which Dr. Jacobi reached in her experiment with the child already referred to. Had this child's accomplishments been reported to us in ordinary conversation, we should have regarded her as a phenomenon. But it is evident that her teacher believes that what was done with her could be done with the average child; and we have too much confidence in Dr. Jacobi to deny it without due consideration, yet would like to see the experiment carried out on a large scale before deciding that the plan was a feasible one. Having given no little attention to the study of languages, and knowing some of their difficulties, we are astonished to find the author stating that "one great reason for teaching children a reading acquaintance with four or five languages between the ages of eight and fourteen, is, that by the latter age they may really know these languages, and then begin to study something else, or of more immediate practical utility," as if a child could at the age of fourteen have a reading acquaintance with four or five languages, and really know them. We should be glad to learn that the opportunity had been given Dr. Jacobi to carry out her plan on a sufficiently extended scale to determine its practicability, for the results which she claims are certainly much to be desired.

AMONG THE PUBLISHERS.

GINN & CO. have just issued "A Vocabulary to the First Six Books of Homer's Iliad," by Professor Thomas D. Seymour of Yale College. It is claimed that a concise special vocabulary to the Homeric poems, or to parts of them, is open to far fewer objections than a similar vocabulary to any other work of Greek literature, since the words are found more nearly in their original significations and constructions. This vocabulary has not been compiled from other dictionaries, but has been made from the poem itself. The maker has endeavored to be concise, — to give nothing but what is important for the accurate and appreciative reading of the Iliad, — and yet to show the original and derived meanings of the words, and to suggest translations which should be both simple and dignified. A confident hope is felt that the concise form of this vocabulary will save much time for the beginner in Homer. More than twenty woodcuts, most of which are new in this country, illustrate the antiquities of the Iliad.

— *The Index of Current Events* (Montreal) was originally intended as a weekly for the use of editors only, and the amount of the annual subscription was decided upon with due regard to the comparatively limited possibilities in the way of circulation among the class it was intended to serve. It has since been suggested that an index of this character might have a much wider utility, and that in particular all those whose calling it is in any way to educate and mould public opinion would find such a publication of considerable service. *The Index of Current Events* is therefore offered at one dollar per annum, post free.

— T. Y. Crowell & Co. will publish soon George Brandes' "Impressions of Russia," in which are included chapters on Russian literature, which has been translated by Samuel C. Eastman of Concord, N.H., who spent last summer in Denmark, and worked under Brandes' supervision.

— Houghton, Mifflin, & Co. have nearly ready a collection of poems by Dr. S. Weir Mitchell, the eminent Philadelphia physician, entitled "The Cup of Youth," which will be published in shape similar to his former volume, "A New Year's Masque;" and a volume by Mrs. A. J. Woodman, a niece of the poet Whittier, entitled "Picturesque Alaska," giving an amusing account of experiences on a trip to Alaska, illustrated with photographs of the most